

AMENDMENTS TO THE DRAWINGS

The attached two sheets of drawings includes changes to FIGURES 1 and 4A.

Attachment: Replacement Sheets for Figures 1, 4A and 4B.

Annotated Sheets Showing Changes to Figures 1 and 4A.

REMARKS

Claims 1 - 32 remain in the application. Claims 1, 20 and 29 are in independent form.

The drawings stand objected to as failing to comply with 37 CFR 1.84(p)(5) due to reference numeral inconsistencies. To address this objection, Figures 1 and 4A have been amended as shown in the attached annotated drawing sheets to correct inadvertent errors in connection with certain reference numeral designations. It is respectfully submitted that the changes proposed herein to Figures 1 and 4A, in combination with the restated technical description below, will render the drawing figures clear and in full compliance with the regulations. No new matter has been added. Accordingly, it is respectfully submitted that the drawing objections have been overcome.

The Abstract of the disclosure is objected to because of the word "invention" appearing in line 1. Appropriate correction has been made. It is respectfully submitted that the specification is now presented in an acceptable format.

Claims 1 – 32 stand rejected under 35 USC §112, first paragraph, as failing to comply with the enablement requirement. The Applicant wishes to express its appreciation for the Examiner's clear articulation of the confusing aspects, which descriptions have been useful in advancing prosecution of this case. It is now apparent that the inadvertent use of certain reference numerals in connection with the lock bolt drive mechanism have resulted in confusion and misunderstanding. It is respectfully submitted that the drawing changes submitted in connection with Figures 1 and 4A, wherein reference numerals pertaining to the lock bolt drive mechanism have been amended into conformity with the written specification, have been supportive in overcoming this rejection.

Specifically, Figure 1 depicts the gear train mechanism between the lock bolt drive 20 and the lock bolt 18 in an artistically illustrative fashion. In the preferred embodiment, a worm gear and worm drive (32, 34) are used in the gear train between the lock bolt drive 20 and the lock bolt 18.

However, Figure 1 depicts this same gear train as a simple meshing spur gear arrangement. This artistic technique was intended only for illustrative value and not to be an actual depiction of the gear train mechanism between these components. Rather, the specific worm-type gear train mechanism between the lock bolt drive 20 and the lock bolt 18 is shown in the exploded, perspective view of Figure 4A. In Figure 4A, an electric motor (previously incorrectly identified as 24) drives the worm 32 which meshes with the worm gear 34. As the worm 32 spins, it rotates the worm gear 34 in the bearing 40. A screw extends from the worm gear 34 (previously misidentified as reference number 52) and is operatively engaged in a threaded, sidecar-like feature on the carrier 40. Thus, as the worm gear 34 rotates, a screw drive mechanism moves the carrier 40 back and forth, depending upon the direction of rotation. The carrier 40, in turn, advances the lock bolt 18 toward either locked (extended) or unlocked (retracted) positions with respect to holes 54 (or apertures 56) in or on the steering column 12. Thus, when the lock bolt 18 is extended to its locked position in one of the holes 54 (or in an aperture 56 as per Figure 3), the steering column 12 is prevented from rotating. Conversely, when the lock bolt 18 is retracted to its unlocked position, it is withdrawn from the hole 54 (or aperture 56) and the steering column 12 is no longer restrained. By this means, the steering column 12 is placed into and out of a locked (non-operational) condition.

A well-known and undesirable condition can occur with respect to steering column lock mechanisms which, like the subject invention, rely upon the insertion of a lock bolt 18 into a hole 54 (or aperture 56). In such arrangements, an inadvertent binding load may be placed between the lock bolt 18 and the hole 54 (or aperture 56) arising out of a turning force from the steering wheel or from the tires and steering linkage. This binding phenomenon is well documented in US Patent No. 6,571,587 to Dimig et al.

The subject invention addresses this undesirable issue of lock binding through the release mechanism 22. The release mechanism 22 is not depicted in either Figures 4A or 4B. Rather, Figures 4A and 4B illustrate only the lock bolt drive assembly. The release mechanism 22 overcomes the lock binding problem by counter-rotating either the steering column 12 or the lock bolt 18, relative to the other, so as to neutralize the binding load. Thus, when an undesirable binding load places the lock bolt 18 in sheer, the release mechanism 22 counteracts this binding load and removes or at least substantially reduces the sheering load upon the lock bolt 18 so that a small, light-weight motor in the lock bolt drive 20 will be sufficient to retract the lock bolt 18 to the unlocked position.

In one disclosed embodiment, the release mechanism 22 interacts with the steering column 12 via a separate worm drive mechanism 50, 52. Specifically, a worm 50 is carried on or operatively driven by a motor 24, with the worm 50 meshing with a worm gear 52. The worm gear 52 rotates with the steering column 12. Preferably, although not necessarily, the release mechanism 22 functions not only to release sheer stress on the lock bolt 18, but also provides a steering assist function including feedback to the driver in a steer-by-wire system. This embodiment is described in paragraph 15 of the subject application and captured in Claim 29.

It is respectfully submitted that, upon consideration of the corrected drawing Figures 1 and 4A where the accidental misuse of certain reference numbers has resulted in the points of confusion described by the Examiner, that the rejections based on §112, first paragraph, have been overcome. If these clarifications are not sufficient to address the Examiner's concerns and points of confusion, the Applicant's undersigned representative respectfully invites the Examiner to contact him for the purposes of advancing prosecution on the merits of this case.

Turning now to the substantive rejections against the claims, Claims 1 and 16-32 stand rejected under 35 USC 102(e) as being anticipated by Dimig '587. The Applicant expressly reserves its right to traverse this rejection on grounds of prior invention should same become necessary at a later time. Notwithstanding, it is respectfully submitted that Dimig '587 fails to disclose each and every feature of the amended claims in this invention, and for this reason the rejection is overcome. Specifically, Dimig recognizes the problem of lock bolt binding and seeks to solve that problem by application of a powerful motor 18 coupled with a worm drive transmission 20. The transmission 20 includes a cam feature 32 for the purpose of accentuating mechanical advantage. Dimig '587 fails to teach, suggest, or in any way motivate use of a release mechanism such as taught in the subject invention, which is operative to counter-rotate the steering column relative to the lock bolt so as to reduce the binding load on the lock bolt such that a smaller, light-weight motor can be used. In other words, Dimig '587 takes a completely different approach to overcoming the problem of lock bolt binding as proposed by the inventor of the subject application. Accordingly, because Dimig '587 fails to disclose a release mechanism as now more clearly recited in independent Claims 1 and 29, and in the counterpart method step of Claim 20, it is respectfully submitted that the rejection based on anticipation by Dimig '587 has been overcome.

Claims 2 – 15 stand rejected under 35 USC 103(a) as being unpatentable over Dimig '587 in view of Bennett '886. Bennett '886 discloses a locking mechanism for use in the non-analogous art of elevator cars. Not only is the elevator car art non-analogous, but the construction and implementation of Bennett's elevator locking mechanism is quite different than that of the subject invention. Specifically, the point of Bennett '886 is to provide an elevator motor that is capable of holding the entire weight of the elevator car. For safety purposes, the elevator motor is pre-torqued up to the entire car weight before the locks 31-34 are pulled. Load cells 62, 63 (or alternatively strain

gauges 64, 65) measure the effect of pre-torquing the elevator motors against the sheering loads applied against the locks 31-34. There is a synchronizing process whereby the locks 31-34 are not urged to retract until the elevator motor is fully pre-torqued and the sheering load has been reduced to zero. Only then are the locks 31-34 retracted, i.e., when the motor is prepared to support the full weight of the elevator car. It must be appreciated that this concept of pre-torquing a motor prior to an attempted withdrawal of lock bolts is so far removed from the field of vehicular steering, that an engineer skilled in the art of steering assemblies would never look for a solution in Bennett '886. Indeed, there is no suggestion, motivation or teaching whatsoever within either Dimig '587 or Bennett '886 which would motivate one skilled in the art to make the substitution proposed by the Examiner. For example, what feature in Dimig '587 could be equated to the elevator motor in Bennett '886? It is respectfully submitted that the rejection under 35 USC 103(a) must fail for lack of a teaching, motivation or suggestion supporting the proposed combination of features.

Accordingly, it is respectfully submitted that in view of the clarifying amendments made to independent claims 1, 20 and 29, together with the correction of inadvertent reference numeral indications in Figures 1 and 4A, the subject application is now presented in condition for allowance, which allowance is respectfully solicited.

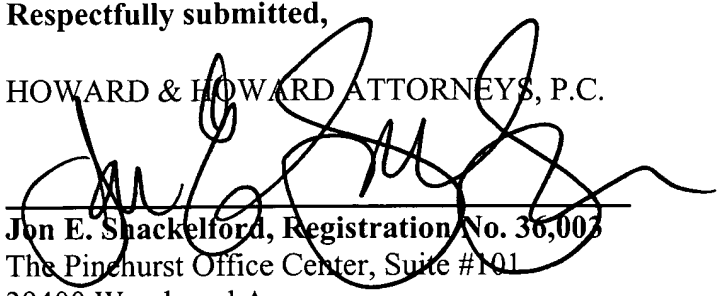
Reconsideration of this application as amended is respectfully requested.

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Respectfully submitted,

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DRAWING CORRECTIONS
HIGHLIGHTED

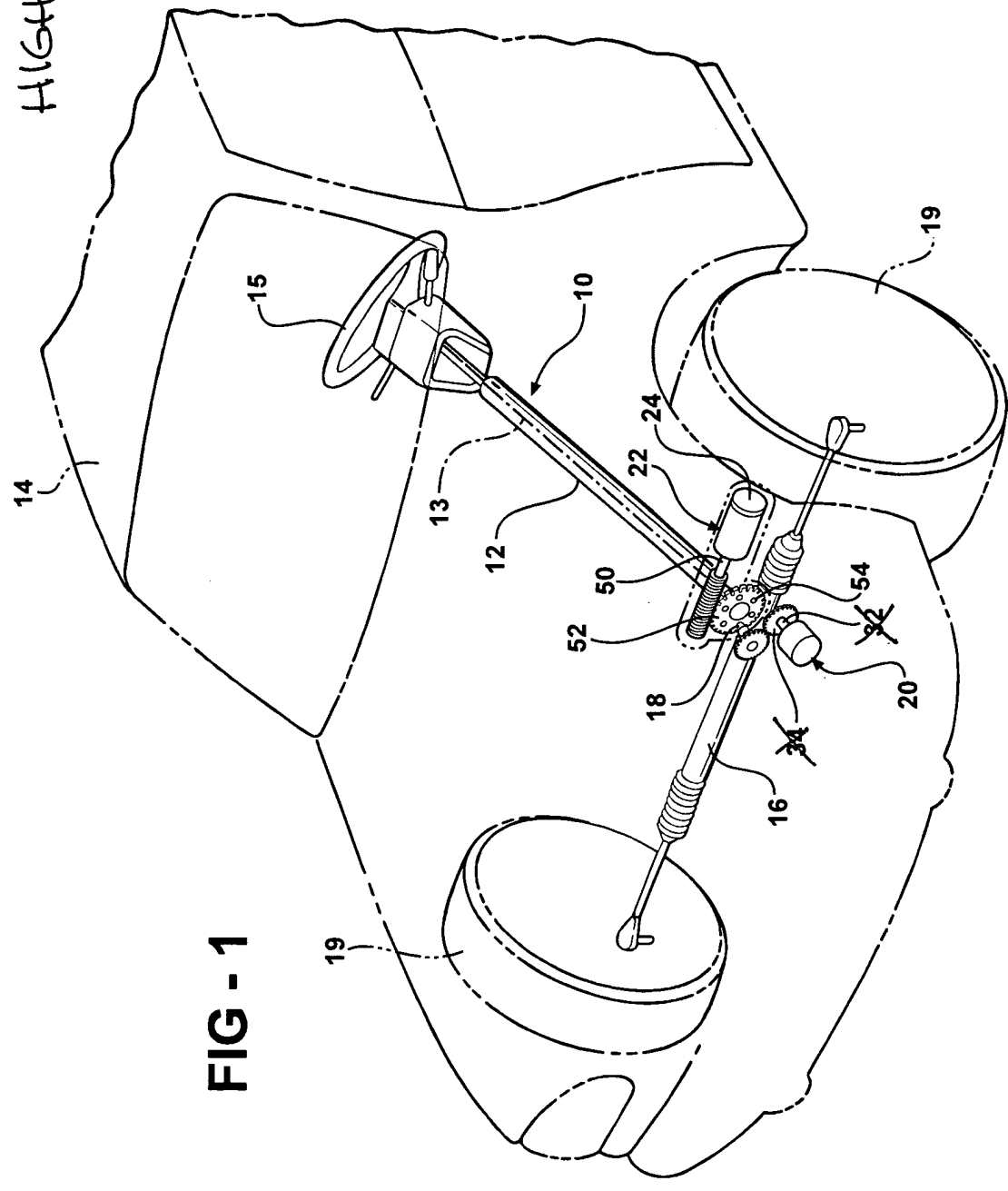


FIG - 1

DRAWING CORRECTIONS
HIGHLIGHTED



FIG - 4A

FIG - 4B

